WASHINGTON
SCIENCE TRENDS

HIGHLIGHTS

* Aircraft Nuclear Propulsion
* Space Agency Contracts
* Special Radar Techniques
* Research Checklist
* Publication Checklist

Vol. II No. 17 July 13, 1959

Aircraft Nuclear Propulsion

All so-called "target dates" in the 14-year-old Atomic Plane program have now been abolished and no schedule now exists for construction of either a ground test prototype or an actual flight demonstration configuration.

Officials closely concerned with the ANP project say that remaining funds will be shifted away from the direct cycle "first generation" reactor which has been under development by the General Electric Co. The money will now go toward advanced materials research by GE and toward similar studies plus indirect cycle "second generation" reactor design by Pratt and Whitney Division, United Aircraft Corp.

The decision, which is being described as a victory of the "scientists vs. the engineers" follows an adverse recommendation by Dr. James R. Killian, Jr., retiring special assistant to the President for Science and Technology. His comment:

"It has not seemed wise...to undertake prematurely to stage a flight demonstration with a nuclear-powered aircraft without first having solved some of the basic technical problems, such as achieving adequate high-temperature materials, which would make it possible, if we had solved them, to build a nuclear-powered aircraft that would have really useful performance. By proceeding in an orderly manner to solve first problems first, we stand a better chance to achieve a successful nuclear- powered plane earlier."

This stand was endorsed, in principle, by Dr. Herbert York, Director of Defense Research and Engineering, and Thomas Gates, new Deputy Secretary of Defense.

On the other hand, backing the GE "fly-early" development were the Joint Chiefs of Staff and John McCone, Chairman of the Atomic Energy Commission who reportedly personally urged President Eisenhower to ask for additional funds to intensify development. The President, in a rare disagreement with McCone, backed the decision to abolish target dates and drop the "fly early" approach.

The Joint Committee on Atomic Energy plans to call in most of the principals in the dispute for a public hearing July 23. Congressional leaders say that they want the public to know some of the facts behind the bitter A-Plane Dispute.

* Space Agency Contracts

House Committee on Science and Astronautics will conduct a staff study of the contract procedures in the Project Mercury Man-In-Space program with particular emphasis on the manned capsule award to McDonnell Aircraft Co. and the $102,000,000 NASA contract with Rocketdyne Division, North American Aviation Inc. for a one and a half million pound thrust single chamber booster engine.

Study, under Raymond Wilcove, Committee Staff consultant, and John A. Carstarphen, counsel for the Investigations Subcommittee, will enlist the aid of the General Accounting Office. Industrial and research organizations concerned with NASA contracting procedures are invited to comment. A decision is expected late this Summer on a possible full-committee investigation.

* Government Research Listing

Deadline for submitting information by "small" research firms interested in Government R&D contracts has been extended to August 1. Necessary forms and instructions for listing in the forthcoming Small Business Administration directory are available without charge. (Write Service Department, Washington SCIENCE TRENDS, 1120 National Press Bldg., Washington 4, D.C.)

* Radioisotope Applications

Atomic Energy Commission will co-sponsor a two-day symposium on industrial uses of radioisotopes in Buffalo, N.Y. August 20 and 21, 1959. In addition to general information on industrial and Government Programs a series of brief experience reports by radioisotope users in the chemical, grain and milling, paper and other process industries will be included. (Management and technical personnel and educators wishing to attend may write Charles F. Light, General Manager, Buffalo Chamber of Commerce, 238 Main St., Buffalo 2, N.Y. for further details.)

* Radioisotope Training

Atomic Energy Commission will send a bus-type mobile training laboratory to small undergraduate colleges for two-week courses on the basic techniques of handling radioisotopes. (Details on the program available from University Relations Division, Oak Ridge Institute of Nuclear Studies, P.O. Box 117, Oak Ridge, Tenn.)'

* Missile Tracking

An AZUSA Mark II electronic tracking system is being readied by Convair Division, General Dynamics for installation at the Atlantic Missile Range. The "highly refined" system is said to be capable of measuring changes in missile position of one-tenth of a foot at distances of hundreds of miles downrange at Cape Canaveral. A field of ten antennas will be used and with a relatively simple addition to the system and a change in the antenna pattern tracking can be extended to Lunar distances. More extensive modification will permit the Mark II to be used for deep space probes. Installation is expected to be completed in 1960.

Special Radar Techniques

National Bureau of Standards has constructed a high-power, VHF radar transmitter and special antenna near Long Branch, Ill. for use with a promising new method for studying physics of the upper reaches of the ionosphere. The observations are expected to supplement, and in some cases, replace rocketborne studies.

* New Method -- Technique developed at the NBS Boulder, Colo. laboratories uses very-high-frequency (VHF) waves, most of which pass through the ionosphere, including those layers which reflect lower-frequency transmissions. By observing vertically-returned scattering researchers can study ionization at all levels of the atmosphere, well into outer space.

  Recent preliminary experiments detected the results of scattering from as far up as 400 miles. The NBS expects that refinements of the experimental set-up will extend this range.

* Technical Characteristics -- Signals at a frequency of 41 megacycles, generated by a transmitter said to be capable of delivering six million watts peak power are pulsed into the fixed antenna and then into space. Antenna beam width is approximately four degrees. Pulses ranging from 50 to 150 microseconds in duration are at a rate sufficient to maintain an average power to 40,000 watts.

  Installation requires four acres of land covered by an antenna array which is composed of 1024 half-wave dipoles located some 4½ feet above a ground-reflecting screen.

* Applications -- NBS points out that until these experiments radar-type ionospheric soundings depended on observation at high (3 to 30 megacycles per second) frequencies of intense reflections from ionospheric layers dense enough to reflect the wave completely.

  This has largely confined studies to determinations of the heights and characteristics of the "maximum density" layers of the ionosphere.

  Future applications of the new technique are expected to make possible measurements of the temperature as well as the electron-density of the upper atmosphere. It is expected that such observations can serve to confirm rocket-derived measurements. But the NBS believes the new technique is more suitable than rocket-mounted instruments for long-term studies of changes in the ionosphere due to diurnal, seasonal and solar activity variations.

Hydrochloric Acid Disposal

Army Chemical Corps expects a net operating savings of close to $2 million dollars through a new technique for disposal of hydrochloric acid at its chlorine plants. Tests at Rocky Mountain Arsenal are said to have demonstrated that it is both economically and technically feasible to process brine through Hooker cells to recover chlorine and caustic reagents.

(Report, including detailed operating instructions, available. 172 pages. $3. Order PB 151 640 from OTS, U.S. Department of Commerce, Washington 25, D.C.)

RESEARCH CHECKLIST

( ) Semiconductor Research: Studies of high-temperature semiconducting materials by the U.S. Army have led to further knowledge of boron and aluminum borides. Electric and chemical properties of the normal rhombohedral form of boron are said to show promise toward the development of devices for operating temperatures up to 500° or 700°C. It is predicted that devices such as thermoelectric generators, electrical thermometers, photovoltaic generators, low voltage rectifiers and infrared windows could be built as soon as material having impurities in the parts-per-million range becomes available.

(R&D by Exploratory Research Division E, U.S. Army Signal R&D Laboratory, Fort Monmouth, N.J.)

( ) Amphibian Vehicles: Studies by the Ordnance Tank-Automotive Command indicate possible advantages in a paddle track as a booster of lift and thrust for amphibian vehicles which generally lack mobility in water. Tests show superior performance over such conventional solutions as buoyant floats, screws or hydrojets.

(Report available. 48 pages. Microfilm $3.30. Photocopy, $7.80. Write Photoduplication Service, Library of Congress, Washington 25, D.C. for PB 137 575)

( ) Reactor Code Studies: The Naval Research laboratory has prepared a few-group, multiregion, one dimensional code for its high-speed digital computer. The code is applied to critical measurements which must be made before the initial operation of a nuclear reactor to determine critical masses and other reactor parameters. The code is said to reduce tedious experimental measurements normally required for safe operation.

(Research by Radiation Division, Nuclear Reactors Branch, U.S. Naval Research Laboratory, Washington 25, D.C.)

( ) Alloy Research: Government-sponsored studies at the University of Michigan have demonstrated the effects of the presence of small amounts of boron and zirconium in a titanium-and-aluminum-hardened nickel-base alloy. Additions were said to prolong the life to fracture and to permit more deformation before fracture.

(Report available. 38 pages. Free. Write Technical Information, NASA, 1520 H Street, N.W. for NACA Report 1392)

( ) Seismic Effects: U.S. Bureau of Mines is expanding research on seismic effects of blasting at stone quarries and other mining operations. Studies are designed to evaluate equipment now used by industry for measuring blast vibrations; to develop improved techniques and formulas for relating the vibrations to a given point to the amount of explosives used and to the distance from the place of detonation. Effects on different types of structures will also be evaluated.

( ) Tracer Research: National Bureau of Standards is now preparing sugar and sugar derivatives having tritium -- the radioactive isotope of hydrogen-- substituted for hydrogen in a specific site within the molecule. Bureau has also developed a convenient method of analysis, a multipurpose apparatus for conducting operations involving tritium in vacuum systems, and a number of syntheses of tritiated reagents and carbohydrate materials. The sugars are expected to aid research workers in such fields as biology, bacteriology, chemistry and medicine by permitting the tracing of a single hydrogen atom through an entire series of complex chemical reactions.

(Report available. 12 pages. Free. Write NBS, Office of Technical Information, Washington 25, D.C. for Summary Tech Report -- Tritium Labeled Sugars)

( ) Rocket Vibration Studies: Studies sponsored by the National Aeronautics and Space Administration are designed to determine the mechanical environment in which rocket components must perform satisfactorily. The project will include specification of characteristic vibration sources; means for reducing complex measured vibration-time data; scaling factors of the vibration environment and a possible means for predicting the environment of untested rocket designs.

(R&D by Mechanics Division, U.S. Naval Research Laboratory, Washington, 25, D.C.)

( ) Nickel-Base Alloys: Government researchers have developed a series of nickel base alloys which reportedly do not require vacuum-melting techniques but generally provide good stress-rupture and impact properties. The compositions were developed for possible aircraft turbine blade or space vehicle applications.

(Report available. 39 pages. Free. Write Technical Information, NASA, 1520 H Street, N.W. for NASA Memo 4-13-59E)

( ) Electronic Contrast Selector: Air Force has developed an electronic contrast selector said to readily extract information from a very low contrast photograph which is almost impossible to detect with the human eye. The equipment counts developed grains in the photograph and presents a revised photograph on a cathode ray tube in which concentrations of grains in excess of the background are printed in gray scale values. The device is said to be applicable for photography of the earth from space, or for obtaining photographic records of celestial bodies that are normally lost in the background of the universe.

(Report available. 8 pages. 50 cents. Write OTS. U.S. Department of Commerce, Washington 25, D.C. for PB 151 585)

( ) Beryllium Applications: Air Force is expressing interest in the possible application of beryllium as a heat sink in aircraft brake discs. This application is said to have excellent potentials because of unusually high thermal properties and the possibility of significant weight reduction.

PUBLICATION CHECKLIST

( ) Radio Equipment, an Army reference guide to the troubleshooting and repair of radio receivers and transmitters. Includes general procedures and special chapters on repair of transistorized equipment and repair of printed circuit assemblies. 177 pages. $2. (Write Superintendent of Documents, Government Printing Office, Washington 25, D.C. for Pub. No. D 101.11:11-4000)

( ) Air Safety and Survival, a Navy manual designed to aid in the obtaining, handling and maintenance of safety survival equipment. A training guide with comprehensive coverage of various items of equipment. 159 pages. $1.75. (Write Superintendent of Documents, Government Printing Office, Washington 25, D.C. for Pub. No D 202.6/7:Sa 1)

( ) Uranium Reconnaissance, a Government study of dielectrical resistivity and dielectric constant of cores from the Colorado Plateau Uranium province. The study was made as part of a program to obtain basic data on the physical properties of the rock in and near uranium-mineralized zones. 28 pages. 20 cents. (Write Superintendent of Documents, Government Printing Office, Washington 25, D.C. for Publication No. I 19.3:1052-H)

( ) National Institutes of Health, a new scientific directory of this major Government research organization, plus a bibliography of published research during 1958 by NIH scientists. 100 pages. Single copies free. (Write Public Inquiry Office, U.S. Public Health Service, Washington 25, D.C. for PHS Publication No. 667)

( ) Moon Map, a large size and technically accurate map of the moon designed to simplify the location of key points of the lunar terrain. Free. (Write General Electric Co. Missile and Space Vehicle Department, Room 4D, 3198 Chestnut Street, Philadelphia 4, Pa.)

( ) Minor Metals, a brief survey of production and consumption of such metals as cesium, gallium, germanium and others. Typical prices and sources of supply are listed. 6 pages. Free. Write Information Office, U.S. Bureau of Mines, Washington 25, D.C. for Mineral Market Report MMS No. 2916 - Minor Metals in 1958)

( ) Air Force Projects, testimony, statements and exhibits relating to the U.S. Air Force construction plans in the U.S. and overseas during the new fiscal year. 1024 pages. Single copies free. (Write Committee on Appropriations, U.S. House of Representatives, The Capitol, Washington 25, D.C. for Military Construction Hearings - Department of the Air Force.)

( ) Re-Entry Problems, an Air Force review of problems inherent in re-entry into the Earth's atmosphere from the standpoints of deceleration, heating and accuracy of impact. 63 pages. $1.75. (Write OTS, U.S. Department of Commerce, Washington 25, D.C. for PB 151 662)

( ) Petroleum and Fuel Plants, lists 283 references on investment and operating costs for chemical and petroleum plants, with special emphasis on synthetic liquid fuels. Covers material published during 1957 by the Government and the trade and technical press. 40 cents. Write Superintendent of Documents, Government Printing Office, Washington 25, D.C. for Bureau of Mines Inf. Circular 7884)

( ) Radiation Preservation of Food, a volume containing information accumulated by the Army during four years of research into the use of ionizing radiation for food preservation. 475 pages. $5. (Write OTS, U.S. Department of Commerce, Washington 25, D.C. for PB 151 493)